ABSTRACT OF THE DISCLOSURE

Electrode active materials comprising lithium or other alkali metals, a transition metal, a phosphate or similar moiety, and a halogen or hydroxyl moiety. Such electrode actives include those of the formula:

$$A_aM_b(XY_4)_cZ_d,$$

wherein

(a) A is selected from the group consisting of Li, Na, K, and mixtures thereof, and $0 < a \leq 6$;

(b) M comprises one or more metals, comprising at least one metal which is capable of undergoing oxidation to a higher valence state, and $1 \leq b \leq 3$;

(c) XY_4 is selected from the group consisting of $X'O_{4-x}Y'_x$, $X'O_{4-y}Y'_{2y}$, $X''S_4$, and mixtures thereof, where X' is P, As, Sb, Si, Ge, S, and mixtures thereof; X" is P, As, Sb, Si, Ge and mixtures thereof; Y' is halogen; $0 \leq x < 3$; and $0 < y < 4$; and $0 < c \leq 3$;

(d) Z is OH, halogen, or mixtures thereof, and $0 < d \leq 6$; and

wherein M, X, Y, Z, a, b, c, d, x and y are selected so as to maintain electroneutrality of said compound.

In a preferred embodiment, M comprises two or more transition metals from Groups 4 to 11 of the Periodic Table. In another preferred embodiment, M comprises $M'_{1-m}M''_m$, where M' is at least one transition metal from Groups 4 to 11 of the Periodic Table; M" is at least one element

from Groups 2, 3, 12, 13, or 14 of the Periodic Table, and $0 < m < 1$. Preferred embodiments include those having where $c = 1$, those where $c = 2$, and those where $c=3$. Preferred embodiments include those where $a \leq 1$ and $c = 1$, those where $a = 2$ and $c = 1$, and those where $a \geq 3$ and $c=3$. This invention also provides electrodes comprising an electrode active material of this invention, and batteries that comprise a first electrode having an electrode active material of this invention; a second electrode having a compatible active material; and an electrolyte.